



Northern Dry-Mesic Mixed Woodland

Dry-mesic conifer, conifer-hardwood, or hardwood woodlands dominated by red pine, white pine, jack pine, black spruce, quaking aspen, or paper birch. Most common on sandy soils but also present on shallow, loamy soils over bedrock. Crown and surface fires were common historically.

Vegetation Structure & Composition

Description is based on summary of vegetation data from 124 plots (relevés).

- **Ground-layer cover** is variable, with Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), large-leaved aster (*Aster macrophyllus*), bracken (*Pteridium aquilinum*), and mountain rice grass (*Oryzopsis asperifolia*) as the most important species.
- **Shrub layer** is patchy to continuous (25-75% cover). Beaked hazelnut (*Corylus cornuta*) is present on nearly all sites and is usually abundant, with 40% average cover. Juneberries (*Amelanchier* spp.) and bush honeysuckle (*Diervilla lonicera*) are present in most sites. Red maple and balsam fir saplings are also common.
- **Subcanopy** most often is absent or sparse.

Paper birch, balsam fir, and red maple are the most frequent subcanopy species.

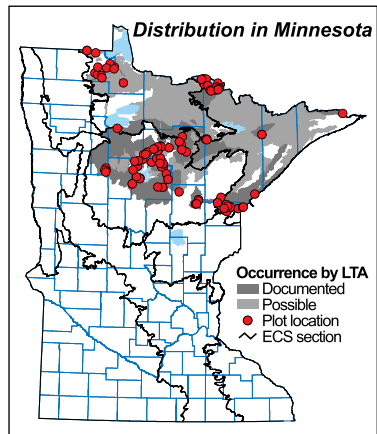
- **Canopy cover** is variable but most commonly is interrupted (50-75%). Canopy composition is often mixed but ranges from solely coniferous to solely deciduous. The most important canopy species are red pine, paper birch, white pine, quaking aspen, red maple, jack pine, big-toothed aspen, and in northwestern Minnesota, black spruce.

Landscape Setting & Soils

- **Outwash plains and dune fields**—Common. Landscape is level to rolling. Parent material is composed mostly of loamy sand or loamy fine sand. This material was initially calcareous, but free carbonates have almost always been leached to depths greater than 60in (150cm). Soils lack subsoil horizons that can perch snowmelt, but complex stratification can cause some retention of rainfall in the rooting zone. Gray and bright colors in the deepest soil horizons suggest that the local water table can occasionally rise to within 40in (100cm) of the soil surface in the spring but falls rapidly in the early growing season. Soils are well drained to somewhat excessively drained. Soil-moisture regime is moderately dry. (Chippewa Plains and Pine Moraines & Outwash Plains in WSU; North Shore Highlands in NSU)

- **Scoured bedrock terrain**—Occasional. Present on level to moderately sloping sites in otherwise rugged landscapes. Parent material available for soil development consists of shallow loamy till or finer material washed into crevices in the rock. Exposed bedrock and boulder-sized rocks are usually evident. Soil depths are typically less than 12in (30cm). Where soils are deeper, the upper horizons are often gray and strongly leached, suggesting a long history of conifer cover. Mosses, lichens, and organic litter are also important substrates for ground-layer plants. These sites are excessively drained. Soil-moisture regime is dry. (Border Lakes and North Shore Highlands in NSU)

- **Stagnation moraines and till plains**—Occasional. Present on level sites within hummocky or rolling landscapes. Parent material is stratified sand, often with modest amounts of gravel and rarely with stones. The surface tends to be loamy sand, with coarser sand in deeper horizons. Soils are well drained to somewhat excessively drained. Soil-moisture regime is moderately dry. (Pine Moraines & Outwash Plains and St. Louis Moraines in MDL; Border Lakes and North Shore Highlands in NSU)





• **Inter-beach deposits**—Rare. Landscape is level to gently undulating. Parent material is very well-sorted fine sand that lacks gravel and large stones. Distinctly gray upper soil horizons are present, suggesting a fairly long history of conifer cover. Soils lack subsoil horizons that can perch snowmelt, but the overall landscape is clayey beneath the sand, and soils can be wet during spring snowmelt. Gray and bright colors in the soil indicate that the local water table is within 15in (40cm) of the soil surface in the spring but falls to about 60in (150cm) early in the growing season. Soils are moderately well to somewhat poorly drained. Soil-moisture regime is moderately moist. (Agassiz Lowlands in MOP)

Natural History

In the past, fires were common throughout the range of FDn33. An analysis of Public Land Survey records indicates that the rotation of catastrophic fires was about 220 years, and the rotation of surface fires about 75 years. The rotation of all fires combined is estimated to be 53 years. Windthrow was not common, with an estimated rotation exceeding 1,000 years. Based on the historic composition and age structure of these woodlands, FDn33 had three growth stages separated by two periods of transition.

- **0-35 years**—Young woodlands recovering from fire, dominated by quaking aspen mixed with red pine, jack pine, and paper birch.
- **35-55 years**—A transition period where quaking aspen and jack pine decline and are replaced by red pine and paper birch. White pine, white spruce, and balsam fir seedlings become established in the understory.
- **55-125 years**—Mature woodlands with a mixed canopy of red pine, paper birch, and white pine with some old quaking aspen. Cohorts of young red pine, white pine, and paper birch are present in the understory in areas affected by surface fires. White spruce and balsam fir are present in the understory in unburned areas.
- **125 years**—Around this age, the community experiences a rapid decline in red pine and a corresponding increase in white pine and to some extent white spruce.
- **>125 years**—Old woodlands dominated by white pine mixed with some red pine, paper birch, and white spruce. In areas unaffected by surface fires, seedlings and saplings of white pine, white spruce, and some balsam fir are present in the understory. In areas recently burned by surface fires, jack pine, red pine, white pine, and paper birch are present in the understory.

Similar Native Plant Community Classes

• FDn32 Northern Poor Dry-Mesic Mixed Woodland

FDn32 and FDn33 are most similar when dominated by red pine and white pine, or in northwestern Minnesota, by black spruce.

▶ **FDn32**—When red pine and white pine are dominant in the canopy, FDn32 is more likely to have common polypody (*Polypodium virginianum*).

▶ **FDn33**—When red pine and white pine are dominant in the canopy, FDn33 is more likely to have chokecherry (*Prunus virginiana*) in the shrub layer and wood anemone (*Anemone quinquefolia*), dwarf raspberry (*Rubus pubescens*), and sweet-scented bedstraw (*Galium triflorum*) in the ground layer. When black spruce is dominant in the canopy, FDn33 is more likely than FDn32 to have species characteristic of rich sites, including side-flowering aster (*Aster lateriflorus*), meadow horsetail (*Equisetum pratense*), field horsetail (*Equisetum arvense*), and mountain fly honeysuckle (*Lonicera villosa*).

• FDn43 Northern Mesic Mixed Forest

FDn43 and FDn33 are most similar when dominated by red pine and white pine or by quaking aspen and paper birch. The ranges of the two classes appear to overlap only in the western and southern parts of NSU.

▶ **FDn43**—When red pine and white pine are dominant in the canopy, FDn43 is more likely to have mountain ash, white cedar, and black spruce in the canopy or understory. When quaking aspen and paper birch are dominant in the canopy, FDn43 is more likely to have balsam fir in the canopy, white spruce and mountain ash in the understory, and twinflower (*Linnaea borealis*), running clubmoss (*Lycopodium clavatum*), and naked miterwort (*Mitella nuda*) in the ground layer.



► **FDn33**—When red pine and white pine are dominant in the canopy, FDn33 is more likely to have northern red oak in the understory, and wintergreen (*Gaultheria procumbens*), round-leaved pyrola (*Pyrola rotundifolia*), hairy Solomon's seal (*Polygonatum pubescens*), pale bellwort (*Uvularia sessilifolia*), and northern bedstraw (*Galium boreale*) in the ground layer.

● **FDc34 Central Dry-Mesic Pine-Hardwood Forest**

FDn33 and FDc34 are most similar when dominated by jack pine or red pine.

► **FDc34**—More likely to have poison ivy (*Toxicodendron rydbergii*), snowberry or wolfberry (*Symphoricarpos* spp.), and American hazelnut (*Corylus americana*) in the shrub layer, and northern bedstraw and blue giant hyssop (*Agastache foeniculum*) in the ground layer.

► **FDn33**—More likely to contain fly honeysuckle (*Lonicera canadensis*) in the shrub layer and bunchberry (*Cornus canadensis*) in the ground layer.

Native Plant Community Types in Class

● **FDn33a Red Pine - White Pine Woodland**

Canopy is typically dominated by red pine or white pine, or occasionally by jack pine. FDn33a is divided into two subtypes:

○ **FDn33a1 Balsam Fir Subtype**

Canopy is most often dominated by red pine and less commonly by white pine or jack pine. FDn33a1 includes some quaking aspen and paper birch woodlands that were probably dominated by pine in the past. Balsam fir and red maple are common in the understory. FDn33a1 is similar to the other subtype of Red Pine - White Pine Woodland, FDn33a2, but generally occurs on somewhat drier and less nutrient-rich sites. Species useful in distinguishing FDn33a1 from FDn33a2 include red pine in the subcanopy, twinflower, and cow-wheat (*Melampyrum lineare*). FDn33a1 nearly always occurs on sandy substrates. It has been documented in the northeastern half of MDL and the western and southern portions of NSU. Description is based on summary of vegetation data from 55 plots.

○ **FDn33a2 Mountain Maple Subtype**

Canopy is typically dominated by red pine or white pine, often with paper birch and red maple in the subcanopy. The presence of mountain maple (*Acer spicatum*), round-lobed hepatica (*Anemone americana*), and large-flowered bellwort (*Uvularia grandiflora*) help to distinguish FDn33a2 from FDn33a1. In addition, lowbush blueberry is somewhat less common in the low-shrub layer in FDn33a2 than in FDn33a1. Documented primarily in MDL; also present in the western part of MOP and, rarely, the southern part of NSU. Description is based on summary of vegetation data from 28 plots.

● **FDn33b Aspen - Birch Woodland**

Canopy most often dominated by quaking aspen or paper birch, and less often by balsam fir, big-toothed aspen, balsam poplar, or red pine. Occasionally, the canopy is dominated by stunted or scrubby northern red oak. Quaking aspen is common in the understory. Beaked hazelnut is usually present and often abundant in the shrub layer; bush honeysuckle is abundant in some sites. In addition to quaking aspen in the canopy, subcanopy, and seedling layers, the presence of yarrow (*Achillea millefolium*) and fireweed (*Epilobium angustifolium*) help to differentiate FDn33b from the other types in FDn33. Documented in the extreme southern and northwestern parts of NSU and the northwestern part of MOP. Appears to be absent from most of MDL. Description is based on summary of vegetation data from 55 plots.

● **FDn33c Black Spruce Woodland**

Canopy is dominated by black spruce, sometimes with small amounts of other conifers such as balsam fir, tamarack, and jack pine. Subcanopy and understory are sparse. Bunchberry is common and abundant in the ground layer. Species that are generally common in FDn33c but uncommon in other types in FDn33 include black spruce (especially in the canopy and subcanopy), mountain fly honeysuckle, Labrador tea (*Ledum groenlandicum*), swamp thistle (*Cirsium muticum*), and field horsetail. Documented only in the northwestern portion of MOP. Description is based on summary of vegetation data from 5 plots.



FDn33 Northern Dry-Mesic Mixed Woodland – Species Frequency & Cover

freq% cover

Forbs, Ferns & Fern Allies	freq%	cover
Canada mayflower (<i>Maianthemum canadense</i>)	98	●●●
Wild sarsaparilla (<i>Aralia nudicaulis</i>)	91	●●●
Bracken (<i>Pteridium aquilinum</i>)	84	●●●
Large-leaved aster (<i>Aster macrophyllus</i>)	84	●●●
Common strawberry (<i>Fragaria virginiana</i>)	81	●●●
Wood anemone (<i>Anemone quinquefolia</i>)	74	●●●
Sweet-scented bedstraw (<i>Galium triflorum</i>)	70	●●●
Dwarf raspberry (<i>Rubus pubescens</i>)	68	●●●
Bunchberry (<i>Cornus canadensis</i>)	66	●●●
Starflower (<i>Therilaxis borealis</i>)	65	●●●
Bluehead lily (<i>Clintonia borealis</i>)	65	●●●
Rose twistedstalk (<i>Streptopus roseus</i>)	63	●●●
Spreading dogbane (<i>Apocynum androsaemifolium</i>)	50	●●●
Pale veitching (<i>Lathyrus ochroleucus</i>)	44	●●●
Lindley's aster (<i>Aster ciliolatus</i>)	43	●●●
Veiny pea (<i>Lathyrus venosus</i>)	42	●●●
Twintlower (<i>Urnaria borealis</i>)	42	●●●
One-sided pyrola (<i>Pyrola secunda</i>)	28	●●●
Red baneberry (<i>Actaea rubra</i>)	28	●●●
Columbine (<i>Aquilegia canadensis</i>)	28	●●●
Pale bellwort (<i>Uvularia sessilifolia</i>)	27	●●●
Early meadow-rue (<i>Thalictrum dioicum</i>)	27	●●●
Groundpine (<i>Lycopodium dendroideum</i> or <i>L. hickeyi</i>)	24	●●●
Round-leaved pyrola (<i>Pyrola rotundifolia</i>)	23	●●●
Northern bedstraw (<i>Galium boreale</i>)	23	●●●
Hairy Solomon's seal (<i>Polygonatum pubescens</i>)	23	●●●
Maryland black snakeroot (<i>Sanicula marilandica</i>)	22	●●●
Cow wheat (<i>Melanophyllum lineare</i>)	21	●●●
American vetch (<i>Vicia americana</i>)	18	●●●
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	17	●●●
Spinulose shield fern or Glandular wood fern*	17	●●●
Gaywings (<i>Polygala pauciflora</i>)	15	●●●
Grasses & Sedges	77	●●●
Mountain rice grass (<i>Oryzopsis asperifolia</i>)		

freq% cover

Pennsylvania sedge (<i>Carex pennsylvanica</i>)	29	●●●				
False melic grass (<i>Schizachne purpurascens</i>)	23	●●●				
Low Shrubs						
Lowbush blueberry (<i>Vaccinium angustifolium</i>)	81	●●●				
Red raspberry (<i>Rubus idaeus</i>)	52	●●●				
Wintergreen (<i>Gaultheria procumbens</i>)	40	●●●				
Velvet-leaved blueberry (<i>Vaccinium myrtilloides</i>)	24	●●●				
Shrubs						
Beaked hazelnut (<i>Corylus cornuta</i>)	95	●●●●				
Junberries (<i>Amelanchier</i> spp.)	86	●●●●				
Bush honeysuckle (<i>Dierilla lonicera</i>)	80	●●●●				
Fly honeysuckle (<i>Lonicera canadensis</i>)	60	●●●●				
Chokecherry (<i>Prunus virginiana</i>)	58	●●●●				
Prickly or Smooth wild rose (<i>Rosa acicularis</i> or <i>R. blanda</i>)	52	●●●●				
Round-leaved dogwood (<i>Cornus rugosa</i>)	34	●●●●				
Mountain maple (<i>Acer spicatum</i>)	31	●●●●				
Downy arrowwood (<i>Viburnum rafinesquianum</i>)	28	●●●●				
Prairie willow (<i>Salix humilis</i>)	22	●●●●				
Hairy honeysuckle (<i>Lonicera hisuta</i>)	21	●●●●				
Green alder (<i>Alnus viridis</i>)	18	●●●●				
Snowberry or Wolfberry (<i>Symphoricarpos albus</i> or <i>S. occidentalis</i>)	13	●●●●				
Trees						
Canopy	Subcanopy	Shrub Layer				
freq% cover	freq% cover	freq% cover				
Red pine	49	●●●●	27	●●●	6	●●●
Paper birch	47	●●●●	65	●●●	32	●●●
Quaking aspen	35	●●●●	30	●●●	50	●●●
White pine	31	●●●●	19	●●●	39	●●●
Red maple	27	●●●●	51	●●●	69	●●●
Balsam fir	20	●●●●	38	●●●	65	●●●
Jack Pine	18	●●●●	8	●●●	–	–
Big-toothed aspen	15	●●●●	15	●●●	9	–
White spruce	12	●●●●	15	●●●	22	●●●
Northern red oak	11	●●●●	31	●●●	44	●●●
Black spruce	6	●●●●	7	●●●	3	●●●

*Spinulose shield fern or Glandular wood fern (*Dryopteris carthusiana* or *D. intermedia*)